

**PART 1      GENERAL**

**1.1            RELATED SECTIONS**

- .1      Section 03 10 00 – Concrete Forming and Accessories
- .2      Section 03 20 00 – Concrete Reinforcing
- .3      Section 03 30 00 – Cast-In-Place Concrete

**1.2            MEASUREMENT PROCEDURES**

- .1      Concrete panels – Launchway: Supply and installation of the pre-cast concrete panels for the launchway will be measured in square metres (m<sup>2</sup>) calculated from the actual field measurements, excluding the area occupied by the coping. Include all plant, equipment and labour in the unit price.

**1.3            REFERENCES**

- .1      American Society for Testing and Materials International (ASTM)
  - .1      ASTM A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
  - .2      ASTM A775/A775M, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
  - .3      ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.
  - .4      ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
  - .5      ASTM D2240, Standard Test Method for Rubber Property - Durometer Hardness.
- .2      Canadian General Standards Board (CGSB)
  - .1      CAN/CGSB-1.40, Anticorrosive Structural Steel Alkyd Primer.
  - .2      CAN/CGSB-1.181, Ready Mixed Organic Zinc-Rich Coating.
- .3      Canadian Standards Association (CSA International)
  - .1      CSA-A23.1, Concrete Materials and Methods of Concrete Construction
  - .2      CSA-A23.2, Methods of Test and Standard Practices for Concrete.
  - .3      CSA-A23.3, Design of Concrete Structures.
  - .4      CSA-A23.4, Precast Concrete - Materials and Construction.
  - .5      CAN/CSA-A3000-, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
  - .6      CAN/CSA-G30.18-, Billet-Steel Bars for Concrete Reinforcement.

- .7 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .8 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .9 CAN/CSA-S6, Canadian Highway Bridge Design Code.
- .10 CSA-W47.1, Certification of Companies for Fusion Welding for Steel.
- .11 CAN/CSA W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .12 CSA-W59, Welded Steel Construction (Metal Arc Welding) (Metric version).
- .13 CSA-W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

#### **1.4 DESIGN REQUIREMENTS**

- .1 Design precast lifting inserts to CSA-A23.3 and CSA-A23.4 to carry handling stresses.
- .2 Provide detailed calculations and design drawings for typical precast lifting inserts.

#### **1.5 PERFORMANCE REQUIREMENTS**

- .1 Tolerance of precast elements to CSA-A23.4.

#### **1.6 SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings in accordance with CSA-A23.3 and CSA-A23.4 and include following items:
  - .1 Design calculations for items designed by manufacturer.
  - .2 Details of prestressed and non-prestressed members, reinforcement and their connections.
  - .3 Camber.
  - .4 Finishing schedules.
  - .5 Methods of handling and erection.
  - .6 Openings, sleeves, inserts and related reinforcement.
- .3 Submit 2 copies of detailed calculations and design drawings for typical precast elements and connections for review by Departmental Representative 2 weeks prior to manufacture.
- .4 Shop Drawings: submit drawings stamped and signed by qualified professional engineer registered or licensed in Provinces of Newfoundland and Labrador, Canada.

#### **1.7 QUALITY ASSURANCE**

- .1 Quality Control Plan: submit written report to Departmental Representative verifying compliance that concrete provided meets performance requirements of concrete.

**1.8 QUALIFICATIONS**

- .1 Fabricate and erect precast concrete elements by manufacturing plant certified in appropriate category according to CSA-A23.4
- .2 Precast concrete manufacturer to be certified in accordance with CSA's certification procedures for precast concrete plants prior to submitting tender and to specifically verify as part of tender that plant is currently certified in appropriate category.
- .3 Only precast elements fabricated in such certified plants to be acceptable to Departmental Representative and plant certification to be maintained for duration of fabrication and erection.
- .4 Proof of previous pre-cast experience and certified quality control documentation will be accepted as equivalent.
- .5 Welding companies certified to CSA-W47.1.

**1.9 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, handle and store precast units according to manufacturer's instructions.
- .2 Protect units from contacting earth to prevent from staining.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- .1 Cement to CAN/CSA-A3001, Type GU.
- .2 Water: to CSA-A23.1/A23.2.
- .3 Reinforcing steel: to CAN/CSA-G30.18, Grade 400.
- .4 Welded wire fabric: to CSA G30.14/G30.15.
- .5 Hardware and miscellaneous materials: to CSA-A23.1/A23.2.
- .6 Forms: to CSA-A23.4.
- .7 Anchors and supports: to CAN/CSA-G40.21 Type 300 W galvanized after fabrication.
- .8 Welding materials: to CSA W48.
- .9 Welding electrodes: to CSA W48 certified by Canadian Welding Bureau.
- .10 Galvanizing: hot dipped galvanizing with minimum zinc coating of 610 g/m<sup>2</sup> to CAN/CSA-G164.

- .11 Steel primer: to CAN/CGSB-1.40 MPI #23.
- .12 Zinc-rich primer: to CAN/CGSB-1.181 MPI #18.
- .13 Bearing pads: neoprene, 45 durometer hardness to ASTM D2240, and 400 MPa minimum tensile strength to ASTM D412, cut from moulded sheet.
- .14 Air entrainment admixtures: to CAN3-A266.1.
- .15 Chemical admixtures: to CAN3-A266.2.

## **2.2 MIXES**

- .1 Concrete:
  - .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria in accordance with CAN/CSA-A23.1/A23.2.
    - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance.
    - .2 Provide concrete mix to meet following hard state requirements:
      - .1 Durability and class of exposure: C-1.
      - .2 Minimum compressive strength at 28 days: 35 MPa.
      - .3 Maximum water to cementing materials ratio: 0.40
      - .4 Minimum cement content: 385 kg/m<sup>3</sup>.
      - .5 Aggregate size: 19 mm maximum.
      - .6 Air content: 5 to 8%.
      - .7 Chemical admixtures: in accordance with CAN3-A226.4
    - .3 Provide quality management plan to ensure verification of concrete quality to specified performance.
    - .4 Concrete supplier's certification.
- .2 Grout:
  - .1 Minimum compressive strength: 50 MPa at 28 days.
- .3 Do not use calcium choride.

## **2.3 MANUFACTURED UNITS**

- .1 Manufacture units in accordance with CSA-A23.4.
- .2 Mark each precast unit to correspond to identification mark on shop drawings for location with date cast on part of unit not to be exposed.
- .3 Provide hardware suitable for handling elements.

- .4 Galvanize anchors and steel embedments after fabrication and touch up with zinc-rich primer after welding.

## **2.4 FINISHES**

- .1 Finish sides and bottom of units to standard grade to CSA-A23.4.
- .2 Surface texture: water blast to provide a surface profile of 5 mm in accordance with ASTM D4259.

## **2.5 SOURCE QUALITY CONTROL**

- .1 Provide Departmental Representative with certified copies of quality control tests related to this project as specified in CSA-A23.4.
- .2 Provide records from in-house quality control program based upon plant certification requirements to Departmental Representative for inspection and review.
- .3 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel supplied, showing physical and chemical analysis.
- .4 Precast plants should keep complete records of supply source of concrete material, steel reinforcement and provide to Departmental Representative for review upon request.

# **PART 3 EXECUTION**

## **3.1 ERECTION**

- .1 Do precast concrete work in accordance with CSA-A23.4.
- .2 Do welding in accordance with CSA-W59, for welding to steel structures and CSA-W186, for welding of reinforcement.
- .3 Erect precast elements within allowable tolerances as specified.
- .4 Non-cumulative erection tolerances in accordance with CSA-A23.4.
- .5 Set elevations and alignment between units to within allowable tolerances before connecting units.
- .6 Grout between units with shrinkage compensating grout.
- .7 Use grout to align elevations of surfaces at joints. Slope grout not more than 1:12.

## **3.2 VERIFICATION**

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete by Departmental Representative and provide verification of compliance.

**3.3 CLEANING**

- .1 Use cleaning methods as reviewed by Departmental Representative before cleaning soiled precast concrete surfaces.

**END OF SECTION**